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tainly a trace of the green band. Photographs of the spectrum also show it to be continuous, but the wide slit employed leaves it in doubt whether FRAUNHOFER (dark) lines were present or not.

It is a remarkable coincidence that a bright comet should be observed near the radiant point of the BIELAN meteors, and that it should grow larger nearly at the time they were expected, and yet lie beyond the orbit of *Mars*, receding both from the Sun and from the Earth.

g. Discovered by BROOKS, Nov. 19, at Geneva, N. Y. No spectroscopic observations yet secured.

1892, November 28.

THE YERKES OBSERVATORY OF THE UNIVERSITY OF CHICAGO.*

GEORGE E. HALE, Director.

Through the munificence of CHARLES T. YERKES of Chicago, the University of Chicago is to have an astronomical observatory of the first class. Indeed, it is Mr. YERKES' express desire that in every particular the new observatory shall as nearly as possible attain the existing ideas of perfection. No definite limit has as yet been assigned to the expenditure contemplated, but the generosity of the donor is fully indicated by his wish that the completed observatory shall be second to none.

The aperture of the great telescope, which will form the central feature of the establishment, will shortly be decided upon in accordance with the condition that it must surpass that of the largest existing instrument—the 36-inch refractor of the LICK Observatory. It is probable that a size between 40 and 45 inches will be selected. A pair of 40-inch discs of glass, which were made some time ago for the University of Southern California, are now for sale, and these may possibly be obtained.

The mounting of the telescope is already under discussion, and its general features have been decided upon. The quick and

* Abstract of an article in *Astronomy and Astro-Physics* for November, 1892.

slow motions of the telescope, clamping in right ascension and declination, rise and fall of the floor upon which the observer stands, rotation of the dome, etc., will all be operated by electric push-buttons within easy reach of the astronomer at the eye-end of the instrument. They will also be under the control of an assistant seated at a table on the rising floor. Electric devices for operating large telescopes have not hitherto been employed, even on the great LICK telescope. They were long ago suggested, however, by Sir HOWARD GRUBB and Dr. DAVID GILL.

The diameter of the dome will naturally depend upon the focal length of the telescope, but it will probably be in the neighborhood of 85 feet. As in the case of the LICK Observatory and the new Naval Observatory at Washington, the entire floor of the observing room will be made to rise and fall by means of hydraulic rams. The cumbrous observing chair once in vogue is thus done away with, and the utmost convenience to the astronomer secured.

The remainder of the observatory's equipment is still undetermined, but it will probably include a 16-inch refractor, 12-inch "twin" equatorial, with visual and photographic objectives, 6-inch meridian circle, and 20-inch siderostat.

But the equipment of an observatory is only a means to an end. It is intended that the YERKES Observatory shall be devoted to investigation, and even at this early day an outline of the work which may profitably be undertaken will not be without interest.

In the field of general research the YERKES telescope should be applied to the search for new satellites, the study of faint and difficult details of planetary markings, the measurement of BURNHAM's more difficult doubles, and many similar observations. In stellar spectroscopy a great opportunity will be open, for the immense light-grasping power of the new objective will allow the spectra of stars now beyond our reach to be investigated. The work so ably began by KEELER at the LICK Observatory on the spectra and motions of the planetary nebulae should be continued and extended. A new departure in the work of large observatories will be the inauguration of a more extensive study of the Sun than has previously been undertaken. This department will be the special province of the writer, and plans for the work have been fully matured.

In applying on a large scale the photographic methods devised

and now in use at the KENWOOD Observatory, and in adding to and extending them, it will for the first time be possible to completely investigate every variety of solar phenomena. The corona should perhaps be excepted, but it is not altogether impossible that a new instrument now being constructed at the KENWOOD Observatory for the purpose of photographing it in full sunlight may prove a success. With an automatic apparatus, also devised here recently, photographs of the Sun, showing all of the phenomena of its surface, will be taken at intervals of about five minutes throughout the day. Photographs will also be taken at frequent intervals with a 12-inch photographic objective and amplifying lens, showing the Sun on a scale of about four inches to the diameter, and others of individual spots on a scale of sixteen inches to the diameter. A spectroheliograph will be so attached to the great telescope that photographs of groups of faculæ and prominences may be taken on a scale of about seven inches to the Sun's diameter, and also by the use of an amplifying lens, on a scale of sixteen inches to the diameter. These photographic observations will be supplemented by simultaneous visual observations, and the spectra of faculæ, spots and prominences will be investigated both photographically and visually. Various special investigations on the Sun will also be undertaken, and the records of self-registering magnetic instruments will assist in the solution of the perplexing question as to the relation existing between solar and terrestrial phenomena.

The astronomers who are to be in charge of the other departments of work having not yet been appointed, no more definite plans can at present be formulated for the investigations other than solar. It is hoped that the importance of the observatory will be measured rather by its work than by its instruments, and that the expectations naturally raised by so perfect an equipment will not be disappointed.

KENWOOD OBSERVATORY, University of Chicago,
October 17, 1892.

THE METEORS OF NOVEMBER 23, 1892.

BY DANIEL KIRKWOOD, of Riverside, California.

The shower of meteors on the evening of November 23, 1892, was, in Southern California, a very brilliant one. The display was not expected till two or three days later, so that we were